

Stop-Start Technology is Coming

It's so obvious you might wonder why stop-start engines aren't standard on all vehicles, but making stop-start work smoothly, safely and reliably is not as simple as it first seems.



A stop-start engine is just that: when the vehicle stops, so does the engine. When the driver presses the accelerator the engine restarts automatically and the vehicle moves off. What could be a more logical way of saving fuel in traffic conditions and greatly reducing concentrations of emissions around heavily trafficked areas?

Land Rover recently launched the Freelander 2 TD4e Stop/Start model, but, while it's the first 4x4 to be so equipped, Citroen has been selling its 2WD C3 Stop-Start car for five years. The Land Rover Stop/Start system is available only on manuals at this stage, as is the soon to be released BMW system, but the Citroen unit works with an automated manual transmission.

Emissions reduction is an obvious advantage of the new Freelander manual over the outgoing one, but there's also a measured economy benefit of up to 20 percent in heavy traffic conditions.

In the case of the Freelander Stop/Start the vehicle must be stationary, the gearbox in neutral and the clutch pedal raised. To re-start, the driver depresses the clutch and the starter motor spins up the engine, ready for first gear selection.

When the engine is being stopped by the Stop/Start system the fuel injection rate shuts down progressively to avoid engine 'shake'.

It's obvious that the Land Rover Stop/Start system puts more load on the battery, starter motor, flywheel and ring gear, so all these components have been upgraded. The new battery is an absorbed glass mat type that tolerates deeper discharge than a conventional lead-acid type.

The braking system has also been modified, because it's likely that in traffic a Stop/Start Freelander will be running downhill in a series of stops, without engine operation. The vacuum boost sensor measures reserve power and can signal an engine restart if the reservoir is lacking.

The water pump is engine operated, but an auxiliary unit cuts in when the engine stops, to maintain coolant circulation.

Other factors that had to be considered for the new Freelander 2 diesel manual include assuring that the air-conditioning, entertainment and Bluetooth systems had enough power. When battery charge drops below a safe level in traffic conditions the engine restarts automatically to recharge it.

Alternative Stop-Start

Valeo's StARS micro-hybrid system (Starter Alternator Reversible System), as used in the C3 and soon to be adopted by a number of other vehicle makers, uses a different approach that uses a single starter-alternator instead of the conventional separate starter motor and alternator.

The starter-alternator is driven by a belt that can also be used to drive other accessories, such as the air conditioning compressor, the water pump and the power steering. A reversible tensioner allows power to be transmitted in both directions, depending on whether the StARS starter-alternator is working as a starter or a generator.

Valeo is developing a super capacitor based extension, StARS + X, to support regenerative braking and provide a greater reduction in fuel consumption than is possible with the stop-start system alone. Mazda's petrol-engine, Smart Idle Stop System (SISS) injects fuel directly into the cylinders while the engine is stopped and ignition then starts it.

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